TEST REPORT

Product Name : Smart Lock U300

Model Number : DL-D02E, DL-D02D

Prepared for	:	Lumi United Technology Co., Ltd
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Report Number	:	EDG2404300196E01206R
Date(s) of Tests	:	April 30, 2024 to May 30, 2024
Date of issue	:	May 31, 2024

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1 TEST RESULT CERTIFICATION

Applicant	:	Lumi United Technology Co., Ltd
Manufacturer	:	Lumi United Technology Co., Ltd
EUT	:	Smart Lock U300
Model Name	:	DL-D02E, DL-D02D
Trademark	:	Aqara

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
ETSI EN 300 330 V2.1.1:2017	PASS
AS/NZS4268:2017Amd 1:2021	PASS

The device described above is tested by EMTEK (DONGGUAN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (DONGGUAN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment under Test) is technically compliant with the ETSI EN 300 330 v2.1.1 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK (DONGGUAN) CO., LTD.

Date of Test : April 30, 2024 to May 30, 2024

Prepared by : Warren Deng /Editor

Reviewer : Tim Dong /Supervisor

Approve & Authorized Signer : Sam Lv /Manager

2 EUT DESCRIPTION

Product Name:	Smart Lock U300
Model Number:	DL-D02E, DL-D02D All models are the same, except the model name. Here, DL-D02E is selected to test all the test items.
Modulation:	ASK
Operating Frequency Range:	13.56MHz
Number of Channels:	1 channel
Antenna Type:	Coil antenna
Power supply:	DC 6V from battery DC 5V from USB
Adapter:	/
Temperature Range:	Outer Panel:-30° C~55° C(-22° F~+131° F) Inner Panel:-10° C~55° C(14° F~+131° F)

Note: *for more details, please refer to the User's manual of the EUT.*

Modified Information

Version	Report No.	Revision Date	Summary
Ver.1.0	EDG2404300196E01206R	/	Original Report

3 SUMMARY OF TEST RESULT

Clause	Test Parameter	Verdict	Remark
Transmitter conformance requirements			
Subclasses 4.3.1 & 4.3.2	Permitted range of operating frequencies & Operating frequency ranges	PASS	
Subclasses 4.3.3	Modulation bandwidth	PASS	
Subclasses 4.3.4	Transmitter H-field requirements	PASS Note 1	Only for equipment under class 1 and class 2, in clause 6.1.2
Subclasses 4.3.5	Transmitter RF carrier current	N/A Note 1	Only for equipment under class 3 in clause 6.1.2
Subclasses 4.3.6	Transmitter radiated E-field	N/A Note 1	Only for equipment under class 4 in clause 6.1.2
Subclasses 4.3.7	Transmitter conducted spurious emissions	N/A Note 1	Only for equipment under class 3 in clause 6.1.2
Subclasses 4.3.8	Transmitter radiated spurious domain emission limits < 30 MHz	PASS	
Subclasses 4.3.9	Transmitter radiated spurious domain emission limits > 30 MHz	PASS Note 1	For equipment under class 1, 2 and 4 in clause 6.1.2
Subclasses 4.3.10	Transmitter Frequency stability	N/A	Only for channelized systems
Receiver Conformance requirements			
Subclasses 4.4.2	Receiver spurious emissions	N/A Note 3	Does only apply to receivers which a not co-located with transmitters
Subclasses 4.4.3	Adjacent channel selectivity	N/A	Only for channelized systems in clause 4.4.1
Subclasses 4.4.4	Receiver blocking or desensitization	N/A Note 2	Not for tagging systems in clause 4.4.1

Remark:
N/A: In this whole report not application.
Note 1: Product Classes
Define of Product Class 1 to 4, Please see the EN 300 330 B.2,
Accord to the manufacture and test product, the EUT belong to Product Class 1.
Note 2 : tagging systems: RFID, anti-theft, access control, location systems and NFC
Note 3: These requirements do not apply to receivers used in combination with permanently co-located transmitters continuously transmitting.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

ETSI EN 300 330–Short Range Devices (SRD);Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

4.2 MEASUREMENT EQUIPMENT USED

Conducted Emission Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	100137	2024/4/29	1Year
Signal Analyzer	R&S	FSV30	103039	2024/4/28	1 Year
AMN	Rohde&Schwarz	ENV216	101209	2024/4/28	1Year
AMN	Rohde&Schwarz	ENV216	100017	2024/4/28	1Year
RF Switching Unit	CDS	RSU-M2	38401	2024/4/28	1Year
AMN	Schwarzbeck	NNLK8121	8121-641	2024/4/28	1Year
AMN	Rohde&Schwarz	ESH3-Z6	101101	2024/4/28	1Year
AMN	Rohde&Schwarz	ESH3-Z6	101102	2024/4/28	1Year
Power Splitters & Dividers	Weinschel Associates	WA1506A	A1066	2024/4/28	1Year
Current Probe	FCC	F-52	8377	2024/4/28	1Year
Passive voltage probe	Rohde&Schwarz	ESH2-Z3	100122	2024/4/28	1Year

For Spurious Emissions Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCI	101415	2024/4/28	1Year
Signal Analyzer	R&S	FSV30	103039	2024/4/28	1 Year
Bi-log Hybrid Antenna	Schwarzbeck	VULB9163	141	2024/5/5	1Year
Pre-Amplifie	HP	8447F	OPTH64	2024/4/28	1 Year
Signal Analyzer	R&S	FSV30	103039	2024/4/28	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	1272	2024/5/5	1Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-567	2024/5/5	1Year
Pre-Amplifie	LUNAR EM	PM1-18-40	J10100000081	2024/4/28	1Year
Loop antenna	Schwarzbeck	FMZB1519	1519-012	2024/5/5	1Year

For other test items:

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Wireless Connectivity Tester	R&S	CMW270	102543	2024/4/29	1Year
Automatic Control Unit	Tonscend	JS0806-2	21I8060480	2024/4/29	1Year
Signal Analyzer	KEYSIGHT	N9010B	MY60242456	2024/4/29	1Year
Analog Signal Generator	KEYSIGHT	N5173B	MY61252625	2024/4/29	1Year
UP/DOWN-Converter	R&S	CMW-Z800A	100274	2024/4/29	1Year
Vector Signal Generator	KEYSIGHT	N5182B	MY61252674	2024/4/29	1Year
Frequency Extender	KEYSIGHT	N5182BX07	MY59362541	2024/4/29	1Year
Temperature&Humidity test chamber	ESPEC	EL-02KA	12107166	2024/4/29	1 Year

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under Normal Operating and standby condition. No software used to control the EUT for staying in continuous transmitting and receiving mode for testing.

The receivers will be tested together with the transmitter in operating mode.

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at Building 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description		
EMC Lab.	:	Accredited by CNAS, 2018.11.30 The certificate is valid until 2022.10.28 The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017) The Certificate Registration Number is L2291 Accredited by FCC, August 09, 2018 Designation Number: CN1204 Test Firm Registration Number: 882943 Accredited by A2LA, August 08, 2018 The Certificate Registration Number is 4321.01 Accredited by Industry Canada, November 09, 2018 The Certificate Registration Number is CN0008
Name of Firm	:	EMTEK(SHENZHEN) CO., LTD.
Site Location	:	Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

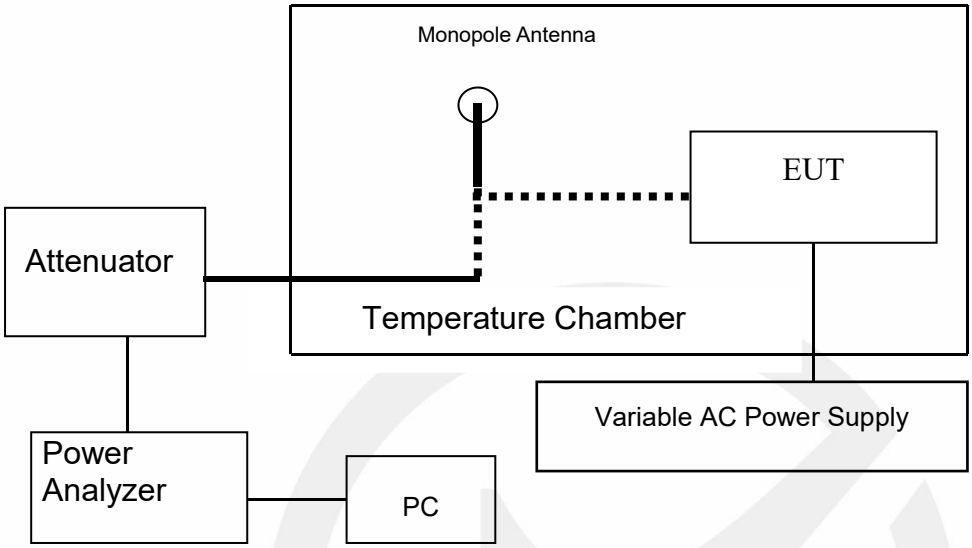
Maximum measurement uncertainty of the test system

Test Parameter	measurement uncertainty
RF Output Power	±1.0%
Duty Cycle	±1.3%
Transmitter Unwanted Emissions in the Spurious Domain	±2.7%
Receiver Spurious Emissions	±2.7%
Temperature	±3.2%
Humidity	±2.5%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

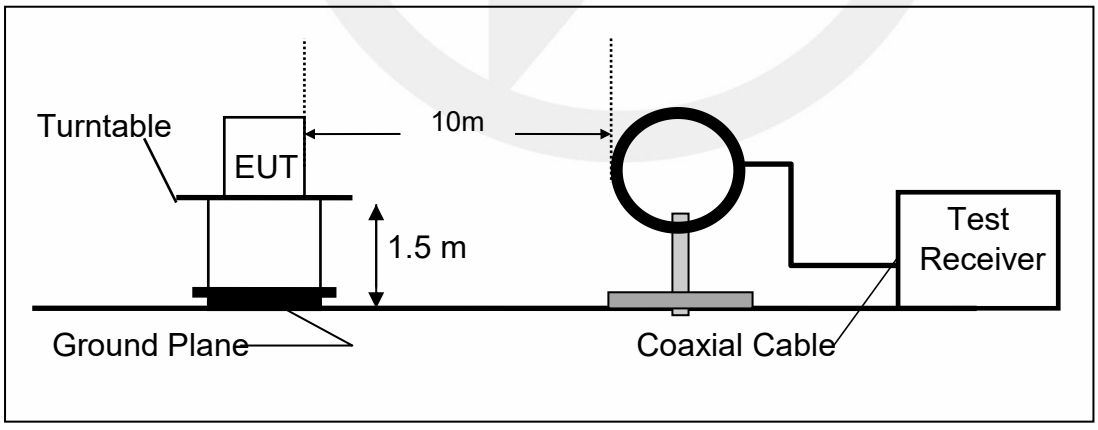
Conducted measurements configuration of EUT shall be as follows:



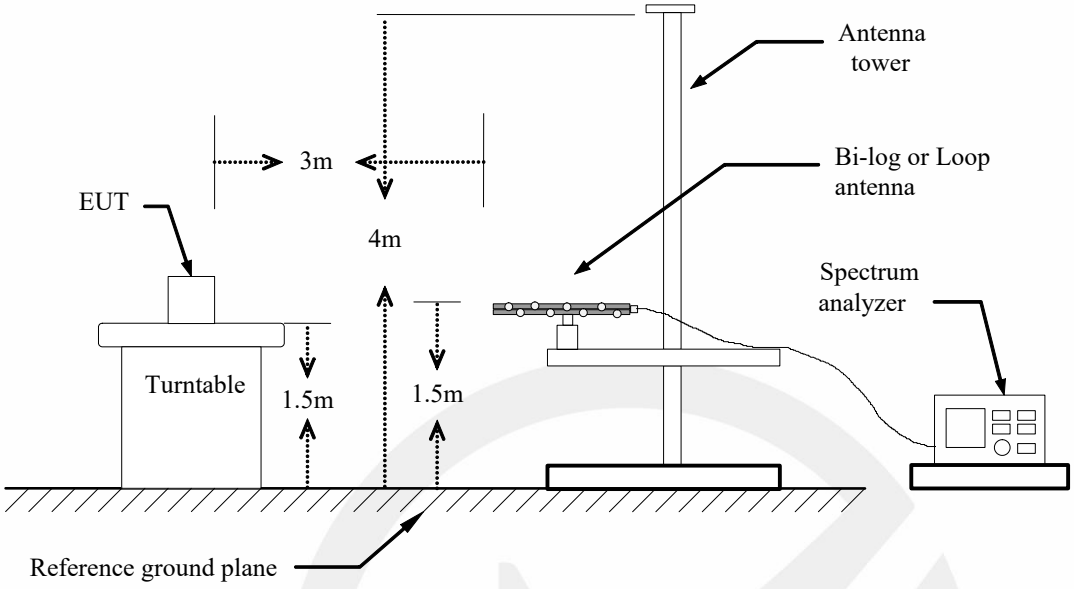
***Remarks**:*
The Signal Analyzer could be connected to a monopole antenna or directly connected to the EUT, if the EUT has already employing an antenna connector.

Radiated measurements configuration of EUT shall be as follows:

Below 30MHz



30MHz-1GHz



7.2 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC cable	1.5	Shielded	Without Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

Notes:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*
3. *Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment*

8 ETSI EN 300 330 REQUIREMENT

8.1 PERMITTED FREQUENCY RANGE OF THE MODULATION BANDWIDTH

8.1.1 Applicable Standard

ETSI EN 300 330 Clause 4.3.1 and 4.3.2

8.1.2 Conformance Limit

The operating frequency ranges for intentional emissions shall be entirely within the frequency bands in table1.

8.1.3 Test Configuration

The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
Radiated measurements shall only be used for integral antenna equipment that does not have a temporary antenna connector(s) provided.
Conducted measurements shall be used for antenna equipment provided a temporary antenna connector(s).

8.1.4 Test Procedure

The measurement antenna shall be placed at one point of the setup up. Alternatively, a current probe could be used.
A spectrum analyser with the following settings is used as measuring receiver in the test set-up:

- Start frequency: lower than the lower edge of the permitted frequency range.
- Stop frequency: higher than the upper edge of the permitted frequency range.
- Resolution Bandwidth: see table 11.
- Video Bandwidth: ≥Resolution Bandwidth.
- Detector mode: RMS.
- Display mode: Maxhold.

The 99 % OBW function shall be used to determine the operating frequency range:

- f_H is determined. fH is the frequency of the upper marker resulting from the OFR.
- f_L is determined. fL is the frequency of the lower marker resulting from the OFR.
- f_C is the centre frequency.

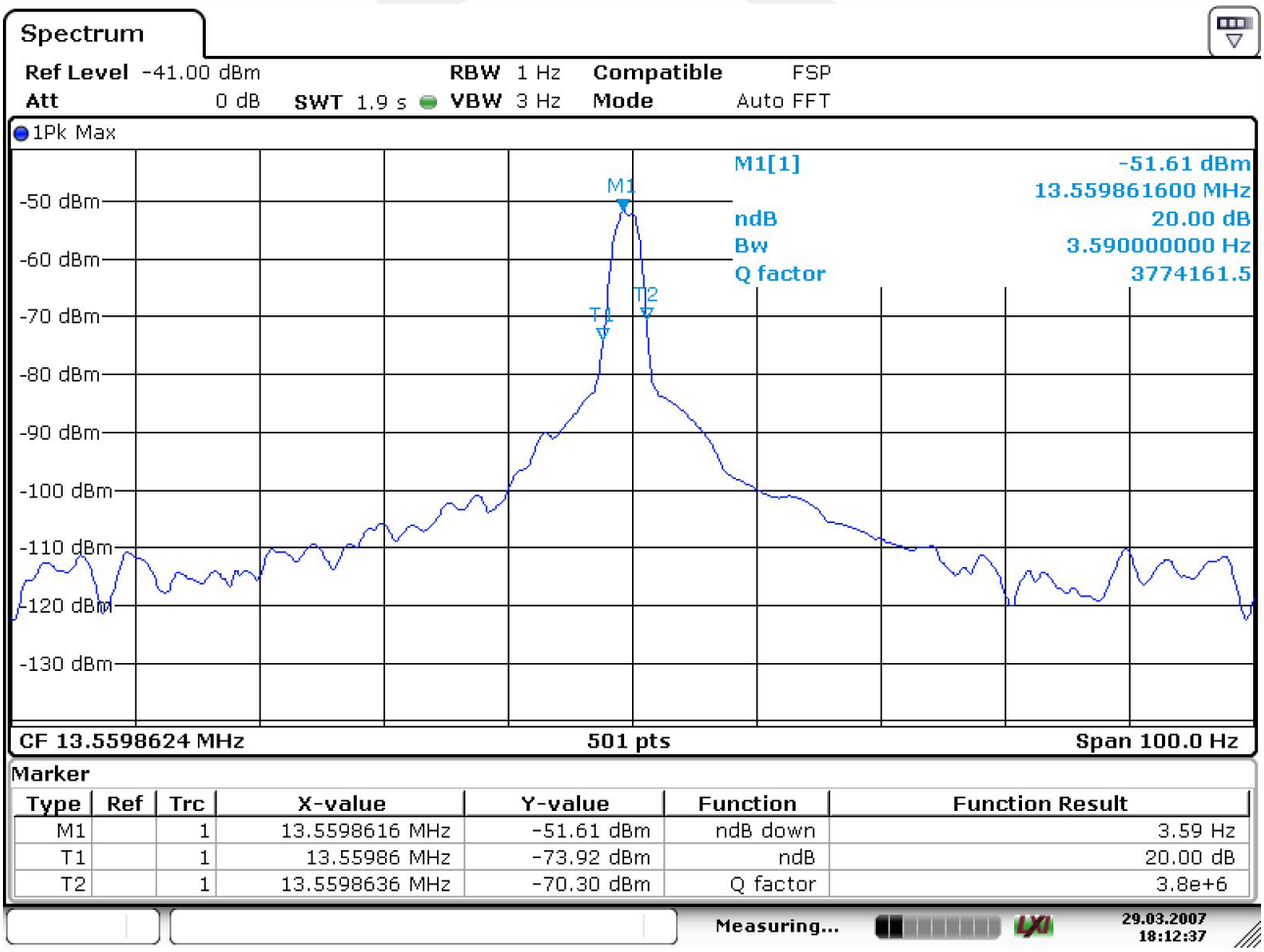
$$f_C = \frac{f_H + f_L}{2}$$

Alternatively, the recorded results from the H-field measurement described in clause 6.2.4 may be used.

8.1.5 Test Result

TEST CONDITION			Result		
Temp.	Voltage		f_L (MHz)	f_H (MHz)	f_C (MHz)
25°C	Vnor	AC230V	13.5598602	13.55598633	13.5598616
-10°C	Vmin	AC207V	13.5598601	13.55598632	13.5598614
	Vmax	AC253V	13.5598603	13.55598633	13.5598615
60°C	Vmin	AC207V	13.5598604	13.55598631	13.5598614
	Vmax	AC253V	13.5598602	13.55598635	13.5598614
Limit			13.553 MHz <f<13.567 MHz		

Only normal test condition test plot presented as below.



8.2 MODULATION BANDWIDTH

8.2.1 Applicable Standard

ETSI EN 300 330 Subclasses 4.3.3

8.2.2 Conformance Limit

The modulation bandwidth shall be within the assigned frequency band see table 1 or ±7,5 % of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the modulation bandwidth shall be within the transmitter emission boundary of figures I.1, I.2, I.3 and I.4.
For further information, see CEPT/ERC/REC 70-03 [i.1] or ERC/ECC/CEPT Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

8.2.3 Test Configuration

The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
Radiated measurements shall only be used for integral antenna equipment that does not have a temporary antenna connector(s) provided.
Conducted measurements shall be used for antenna equipment provided a temporary antenna connector(s).

8.2.4 Test Procedure

The transmitter shall be connected to an artificial antenna or if the transmitter has an integral antenna, a test fixture shall be used (see clause 5.10). The RF output of the equipment shall be connected to a spectrum analyser via a 50 Ω variable attenuator.
The transmitter shall be operated at the nominal carrier power or field strength measured under normal test conditions in clause 4.3.4. The attenuator shall be adjusted to an appropriate level displayed at the spectrum analyser screen.
The transmitter shall be modulated with standard test modulation (see clauses 5.8.1 and 5.8.2). If the equipment cannot be modulated externally, the internal modulation shall be used.
For transmitters using a continuous wideband swept carrier the measurement shall be made with the sweep on.
The output of the transmitter, with or without test fixture, shall be measured by using a spectrum analyser with a resolution bandwidth appropriate to accept all major side bands. The power level calibration of the spectrum analyser shall then be related to the power level or field strength measured in clause 4.3.3. The calculation will be used to calculate the absolute level of the sideband power.
The test laboratory shall ensure that the spectrum analyser's span is sufficiently wide enough to ensure that the carrier and all its major side bands are captured.

The frequency of the upper and lower points, where the displayed power envelope of the modulation including frequency drift is equal to the appropriate level defined in clause 4.3.3 is recorded as the modulation bandwidth.

8.2.5 Test Result

Freq. (MHz)	Reading (dBμV)	Meas. (dBμA/m@3m)	Meas. (dBμA/m@10m)	Limit (dBμA/m@10m)	Margin (dB)	Det.	Pol.	Verdict
13.0493	17.45	-34.05	-44.51	-20	-24.51	PK+	X	PASS
13.2352	18.3	-33.20	-43.66	-16	-27.66	PK+	X	PASS
13.4693	17.34	-34.16	-44.62	-10	-34.62	PK+	X	PASS
13.5610	26.21	-25.29	-35.75	42	-77.75	PK+	X	PASS
13.6450	17	-34.50	-44.96	-10	-34.96	PK+	X	PASS
13.8915	18.47	-33.03	-43.49	-16	-27.49	PK+	X	PASS
14.0840	18.26	-33.24	-43.7	-20	-23.7	PK+	X	PASS

Freq. (MHz)	Reading (dBμV)	Meas. (dBμA/m@3m)	Meas. (dBμA/m@10m)	Limit (dBμA/m@10m)	Margin (dB)	Det.	Pol.	Verdict
13.0525	19.91	-31.59	-42.05	-20	-22.05	PK+	Y	PASS
13.2475	20.18	-31.32	-41.78	-16	-25.78	PK+	Y	PASS
13.4906	20.34	-31.16	-41.62	-10	-31.62	PK+	Y	PASS
13.5586	30.68	-20.82	-31.28	42	-73.28	PK+	Y	PASS
13.6540	19.64	-31.86	-42.32	-10	-32.32	PK+	Y	PASS
13.8711	20.33	-31.17	-41.63	-16	-25.63	PK+	Y	PASS
14.0640	20.43	-31.07	-41.53	-20	-21.53	PK+	Y	PASS

Freq. (MHz)	Reading (dBμV)	Meas. (dBμA/m@3m)	Meas. (dBμA/m@10m)	Limit (dBμA/m@10m)	Margin (dB)	Det.	Pol.	Verdict
13.0573	19.05	-32.45	-42.91	-20	-22.91	PK+	Z	PASS
13.2469	19.00	-32.50	-42.96	-16	-26.96	PK+	Z	PASS
13.4922	19.65	-31.85	-42.31	-10	-32.31	PK+	Z	PASS
13.5547	27.73	-23.77	-34.23	42	-76.23	PK+	Z	PASS
13.6525	18.89	-32.61	-43.07	-10	-33.07	PK+	Z	PASS
13.8594	19.56	-31.94	-42.4	-16	-26.4	PK+	Z	PASS
14.0627	19.28	-32.22	-42.68	-20	-22.68	PK+	Z	PASS

Note: The measuring equipment calibrated in dBμV/m , the reading reduced by 51.5 dB to be converted to dBμA/m via the test software.

8.3 TRANSMITTER H-FIELD REQUIREMENTS

8.3.1 Applicable Standard

ETSI EN 300 330 Subclasses 4.3.4

8.3.2 Conformance Limit

The frequency ranges and limits of the present document are shown as below. The limits are based on the European Commission Decision for SRDs [i.10], CEPT/ERC/REC 70-03 [i.1].

H-field limits at 10 m

Frequency range (MHz)	H-field strength limit (H f) dBμ μA/m at 10 m or specified in mW e.r.p.
0.009 ≤ f < 0.090	72 descending 3 dB/oct above 0.03 MHz or according to note 1 (see note 5)
0.09 ≤ f < 0.119	42
0.119 ≤ f < 0.135	66 descending 3 dB/oct above 0.119 MHz or according to note 1 (see notes 3 and 5)
0.135 ≤ f < 0.140	42
0.140 ≤ f < 0.1485	37.7
0.1485 ≤ f < 30	-5 (see note 4)
0.315 ≤ f < 0.600	-5
3.155≤ f < 3.400	13.5
4.234	9(see note 9)
4.516	7
7.400 ≤ f < 8.800	9
10.2 ≤ f < 11.00	9
12.5 ≤ f ≤ 20	-7
6.765 ≤ f ≤ 6.795	42 (see notes 3 and 7)
26.957 ≤ f ≤ 27.283	42 (see note 3)
13.410 ≤ f ≤13.553, 13.567 ≤ f ≤ 13.710	9 (see note 6)
13.110 ≤ f ≤ 13.410, 13.710 ≤ f ≤ 14.010	-3,5 (see note 6)
12.660 ≤ f ≤ 13.110, 14.010 ≤ f ≤ 14.460	-10 (see note 6)
11.810 ≤ f ≤ 12.660, 14.460 ≤ f ≤ 15.310	-16 (see note 6)
13.460 ≤ f ≤ 13.553, 13.567 ≤ f ≤ 13.660	27 (see note 6)
13.360 ≤ f ≤ 13.460, 13.660 ≤ f ≤ 13.760	Linear transition from 27 to -3.5 (see note 6)
13.110 ≤ f ≤ 13.360, 13.760 ≤ f ≤ 14.010	-3.5 (see note 6)
12.660 ≤ f ≤ 13.110, 14.010 ≤ f ≤ 14.460	-5 (see note 6)
13.553 ≤ f ≤ 13.567	42 (see note 3) or 60 (see notes 2 and 3)
27.095	42
26.995, 27.045, 27.095, 27.145, 27.195 (see note 8)	100 mW

NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dBμA/m:
- for loop coil antennas with an area ≥ 0.16 m^2 this table and EN 300330 table B.1 with the antenna limitations apply;
- for loop coil antennas with an area between 0.05 m^2 and 0.16 m^2 table B.1 applies with a correction factor. The limit is: table value + 10 × log (area/0.16 m^2);
- For loop coil antennas with an area < 0.05 m^2 the limit is 10 dB below table B.1.

NOTE 2: For RFID (incl. NFC) and EAS applications only.
NOTE 3: Spectrum mask limit, see annex I.
NOTE 4: For further information see annex G.
NOTE 5: Limit is 42dBμA/m for the following spot frequencies: 60 kHz ± 250 Hz, 66.6 kHz ± 750 Hz, 75 kHz ± 250 Hz, 77.5 kHz ± 250 Hz, and 129.1 kHz ± 500 Hz.
NOTE 6: Only in conjunction with spectrum mask, see annex I.
NOTE 7: The frequency range 6.765 MHz – 6.795 MHz is not a harmonised ISM frequency band.
NOTE 8: Center frequencies for channelized systems by using ≤ 10 kHz bandwidth.

NOTE 9: The limit is valid in the range 984 kHz - 7 484 kHz for Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.

8.3.3 Test Configuration

The measurements shall be performed at normal environmental conditions of the operating temperature range.
Radiated measurements shall only be used for integral antenna equipment that does not have a temporary antenna connector(s) provided.
Conducted measurements shall be used for antenna equipment provided a temporary antenna connector(s)

8.3.4 Test Procedure

The measurements of the transmitter radiated H-field shall be made on an open field test site as specified in clause C.1.3. Any measured values shall be at least 6 dB above the ambient noise level.
The H-field produced by the equipment shall be measured at standard distance of 10 m. Where this is not practical, e.g. due to physical size of the equipment including the antenna or with use of special field cancelling antenna, then other distances may be used. When another distance is used, the distance used and the field strength value measured shall be stated in the test report. In this case, the measured value at actual test distance shall be extrapolated to 10 m according to annex H and these calculations shall be stated in the test report.
The H-field is measured with a shielded loop antenna connected to a measurement receiver. The measuring bandwidth and detector type of the measurement receiver shall be in accordance with clause 5.12.
The equipment under test shall operate where possible, with modulation. Where this is not possible, it shall be stated in the test report.
For transmitters using a continuous wideband swept carrier, the measurement shall be made with the sweep off. When it is not possible to turn the sweep off the measurements shall be made with the sweep on and this shall be stated in the test report.
For measuring equipment calibrated in dBµV/m, the reading should be reduced by 51,5 dB to be converted to dBµA/m.

8.3.5 Test Result

Frequency (MHz)	Antenna Polarization	Test data (dBuA/m) (10m)	Limit (dBuA/m) (10m)	Result
13.56	X	-16.77	42	Pass
13.56	Y	-21.33	42	Pass
13.56	Z	-15.23	42	Pass

The test plots see the clause 8.2.5

8.4 TRANSMITTER RADIATED SPURIOUS DOMAIN EMISSION LIMITS

8.4.1 Applicable Standard

ETSI EN 300 330 Subclasses 4.3.8 & 4.3.9

8.4.2 Conformance Limit

Below 30MHz
The radiated field strength of the spurious domain emissions below 30 MHz shall not exceed the generated H-field dBuA/m at 10 m given in table 5.

state	Frequency 9kHz≤f<10MHz	Frequency 10MHz≤f<30MHz
Operating	27dBuA/m at 9kHz descending 3dB/oct	-3.5dBuA/m
Standby	5.5dBuA/m at 9kHz descending 3dB/oct	-25dBuA/m

Above 30MHz
The power of any radiated emission shall not exceed the values given in table 6.

state	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 790MHz	Other frequencies between 30MHz to 1000MHz
Operating	4nW	250nW
Standby	2nW	2nW

8.4.3 Test Configuration

The measurements shall be performed at normal environmental conditions of the operating temperature range.
Radiated measurements shall only be used for integral antenna equipment that does not have a temporary antenna connector(s) provided.
Conducted measurements shall be used for antenna equipment provided a temporary antenna connector(s)

8.4.4 Test Procedure

Below 30MHz
The field strength shall be measured for frequencies below 30 MHz. The equipment under test shall be measured at a distance of 10 m on an outdoor test site. The test antenna shall be a calibrated shielded magnetic field antenna. The equipment under test and test antenna shall be arranged as stated in clause C.1.
For Product Class 3 the transmitter antenna connector of the equipment under test shall be connected to an artificial antenna (see clause 5.9) and the output connector terminated.
The equipment under test shall be switched on with normal modulation. The characteristics of the modulation signal used shall be stated on the test report. The measuring receiver shall be tuned over the frequency range 9 kHz to 30 MHz, except for the frequency band on which the transmitter is intended to operate.
At each frequency at which a relevant spurious signal is detected the equipment under test and the test antenna shall be rotated until maximum field strength is indicated on the measuring receiver. This level shall be noted.
If the transmitter can be operated in the standby mode, then the measurements shall be repeated in the standby mode.
For measuring equipment calibrated in dBµV/m, the reading should be reduced by 51,5 dB to be converted to dBµA/m.

Above 30MHz
For classes 1, 2 and 4 an appropriate test site selected from annex C shall be used. The equipment shall be placed at the specified height on a non-conducting support and in the position closest to normal use as

declared by the manufacturer.
The test antenna shall be oriented for vertical polarization. The output of the test antenna shall be connected to a measuring receiver.
The transmitter shall be switched on with normal modulation, and the measuring receiver shall be tuned over the frequency range 30 MHz to 1 000 MHz.
At each frequency at which a relevant spurious component is detected, the test antenna shall be raised and lowered through the specified range of heights until a maximum signal level is detected on the measuring receiver.
The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
The maximum signal level detected by the measuring receiver shall be noted.
The substitution antenna shall be oriented for vertical polarization and calibrated for the frequency of the spurious component detected.
The frequency of the calibrated signal generator shall be set to the frequency of the spurious component detected. The
input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver, if necessary.
The test antenna shall be raised and lowered through the specified range of heights to ensure that the maximum signal is received.
When a test site according to clause C.1.1 is used, there is no need to vary the height of the antenna.
The input signal to the substitution antenna shall be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.
The input signal to the substitution antenna shall be recorded as a power level and corrected for any change of input attenuator setting of the measuring receiver.
The measure of the effective radiated power of the spurious components is the larger of the two power levels recorded for each spurious component at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.
If an unmodulated carrier cannot be obtained then the measurements shall be made with the transmitter modulated by the normal test signal (see clause 5.8.2) in which case this fact shall be recorded in the test report.
If standby mode is available, the measurements shall be repeated in that mode.

8.4.5 Test result

Transmitter Spurious Emissions below 30MHz

Temperature:	25℃	Test Date:	April 26, 2024
Humidity:	52 % RH	Tested by:	Ccyf
Mode:	Operating		

Freq. (MHz)	Ant.Pol.	Emission Level (dBuA/m@3 m)	Emission Level (dBuA/m@10 m)	Limit 10m (dBuA/m)	Over (dB)	Result
0.3520	X	-15.39	-25.85	24.93	-50.78	Pass
0.7020	X	-18.76	-29.22	8.08	-37.3	Pass
0.773	X	-20.21	-30.67	7.66	-38.33	Pass
13.646	X	-19.55	-30.01	-3.50	-26.51	Pass
0.339	Y	-13.75	-24.21	11.24	-35.45	Pass
0.775	Y	-15.32	-25.78	7.65	-33.43	Pass
5.892	Y	-2.48	-12.94	-1.16	-11.78	Pass
13.628	Y	-19.78	-30.24	-3.50	-26.74	Pass
0.893	Z	-17.11	-27.57	7.03	-34.6	Pass
1.794	Z	-17.32	-27.78	4.00	-31.78	Pass
9.234	Z	-20.21	-30.67	-3.11	-27.56	Pass
13.559	Z	-5.22	-15.68	-3.50	-12.18	Pass
Note:	(1)Emission Level= Reading Level+Probe Factor +Cable Loss.					

Temperature:	25℃	Test Date:	April 26, 2024
Humidity:	52 % RH	Tested by:	Ccyf
Mode:	Standby		

Freq. (MHz)	Ant.Pol.	Emission Level (dBuA/m@3 m)	Emission Level (dBuA/m@10 m)	Limit 10m (dBuA/m)	Over (dB)	Result
0.584	X	-12.71	-23.17	8.88	-32.05	Pass
0.793	X	-18.25	-28.71	7.55	-36.26	Pass
1.442	X	-19.44	-29.9	4.95	-34.85	Pass
2.791	X	-20.19	-30.65	-3.50	-27.15	Pass
0.349	Y	-13.03	-23.49	11.11	-34.60	Pass
1.852	Y	-18.57	-29.03	3.87	-32.90	Pass
5.439	Y	-15.32	-25.78	-0.81	-24.97	Pass
10.772	Y	-15.24	-25.7	-3.50	-22.20	Pass
0.566	Z	-11.38	-21.84	9.01	-30.85	Pass
0.857	Z	-15.35	-25.81	7.21	-33.02	Pass
1.334	Z	-18.75	-29.21	5.29	-34.50	Pass
3.665	Z	-20.36	-30.82	-3.50	-27.32	Pass
Note:	(1)Emission Level= Reading Level+Probe Factor +Cable Loss.					

■ Transmitter Spurious Emissions above 30MHz

Operation Mode:	Receiving and transmitting work together	Temperature:	25°C
Operation frequency:	☒ 13.56MHz	Humidity:	55 % RH
Tested by:	XW	Test data:	April 26, 2024

Frequency (MHz)	Antenna Polarization		Emission level (dBm)	Limit (dBm)	Verdict
53.76	☒ V	☐ conducted	-74.66	-54	PASS
98.91			-77.26	-54	PASS
157.63			-78.98	-36	PASS
291.33			-75.28	-36	PASS
531.50			-70.42	-54	PASS
815.84			-66.74	-36	PASS
53.06	☒ H		-74.86	-54	PASS
218.95			-76.94	-54	PASS
355.80			-73.62	-36	PASS
511.82			-70.22	-54	PASS
628.25			-67.74	-54	PASS
853.57			-66.86	-36	PASS

Operation Mode:	Standby	Temperature:	25°C
Operation frequency:	☒ 13.56MHz	Humidity:	55 % RH
Tested by:	XW	Test data:	April 26, 2024

Frequency (MHz)	Antenna Polarization		Emission level (dBm)	Limit (dBm)	Verdict
51.49	☒ V	☐ conducted	-70.41	-57.00	PASS
126.28			-73.56	-57.00	PASS
319.81			-70.95	-57.00	PASS
440.63			-68.94	-57.00	PASS
646.44			-65.99	-57.00	PASS
836.73			-64.87	-57.00	PASS
50.91	☒ H		-71.11	-57.00	PASS
85.48			-74.53	-57.00	PASS
371.65			-69.68	-57.00	PASS
481.75			-67.32	-57.00	PASS
644.12			-66.09	-57.00	PASS
842.71			-64.59	-57.00	PASS

8.5 RECEIVER SPURIOUS EMISSIONS

8.5.1 Applicable Standard

ETSI EN 300 330 Subclasses 4.4.2

8.5.2 Conformance Limit

The spurious components below 30 MHz shall not exceed the generated H-field dBμA/m values at 10 m according to table 8.

State	Frequency 9 kHz ≤f < 10 MHz	Frequency 10 MHz ≤f < 30 MHz
Receiver	5.5 dBμA/m at 9 kHz descending 3 dB/oct	-25 dBμA/m

The spurious components above 30 MHz measured values shall not exceed 2 nW.

8.5.3 Test Configuration

The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
Radiated measurements shall only be used for integral antenna equipment that does not have a temporary antenna connector(s) provided.
Conducted measurements shall be used for antenna equipment provided a temporary antenna connector(s)

8.5.4 Test Procedure

Below 30MHz
The field strength shall be measured for frequencies below 30 MHz. The equipment under test shall be measured at a distance of 10 m on an outdoor test site. The test antenna shall be a calibrated shielded magnetic field antenna. The equipment under test and test antenna shall be arranged as stated in clause C.1.
For Product Class 3 the transmitter antenna connector of the equipment under test shall be connected to an artificial antenna (see clause 5.9) and the output connector terminated.
The equipment under test shall be switched on with normal modulation. The characteristics of the modulation signal used shall be stated on the test report. The measuring receiver shall be tuned over the frequency range 9 kHz to 30 MHz, except for the frequency band on which the transmitter is intended to operate.
At each frequency at which a relevant spurious signal is detected the equipment under test and the test antenna shall be rotated until maximum field strength is indicated on the measuring receiver. This level shall be noted.
If the transmitter can be operated in the standby mode, then the measurements shall be repeated in the standby mode.
For measuring equipment calibrated in dBμV/m, the reading should be reduced by 51,5 dB to be converted to dBμA/m.

Above 30MHz
For classes 1, 2 and 4 an appropriate test site selected from annex C shall be used. The equipment shall be placed at the specified height on a non-conducting support and in the position closest to normal use as declared by the manufacturer.
The test antenna shall be oriented for vertical polarization. The output of the test antenna shall be connected to a measuring receiver.
The transmitter shall be switched on with normal modulation, and the measuring receiver shall be tuned over the frequency range 30 MHz to 1 000 MHz.
At each frequency at which a relevant spurious component is detected, the test antenna shall be raised and lowered through the specified range of heights until a maximum signal level is detected on the measuring receiver.
The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
The maximum signal level detected by the measuring receiver shall be noted.
The substitution antenna shall be oriented for vertical polarization and calibrated for the frequency of the

spurious component detected.
The frequency of the calibrated signal generator shall be set to the frequency of the spurious component detected. The
input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver, if necessary.
The test antenna shall be raised and lowered through the specified range of heights to ensure that the maximum signal is received.
When a test site according to clause C.1.1 is used, there is no need to vary the height of the antenna.
The input signal to the substitution antenna shall be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.
The input signal to the substitution antenna shall be recorded as a power level and corrected for any change of input attenuator setting of the measuring receiver.
The measure of the effective radiated power of the spurious components is the larger of the two power levels recorded for each spurious component at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.
If an unmodulated carrier cannot be obtained then the measurements shall be made with the transmitter modulated by the normal test signal (see clause 5.8.2) in which case this fact shall be recorded in the test report.

If standby mode is available, the measurements shall be repeated in that mode.

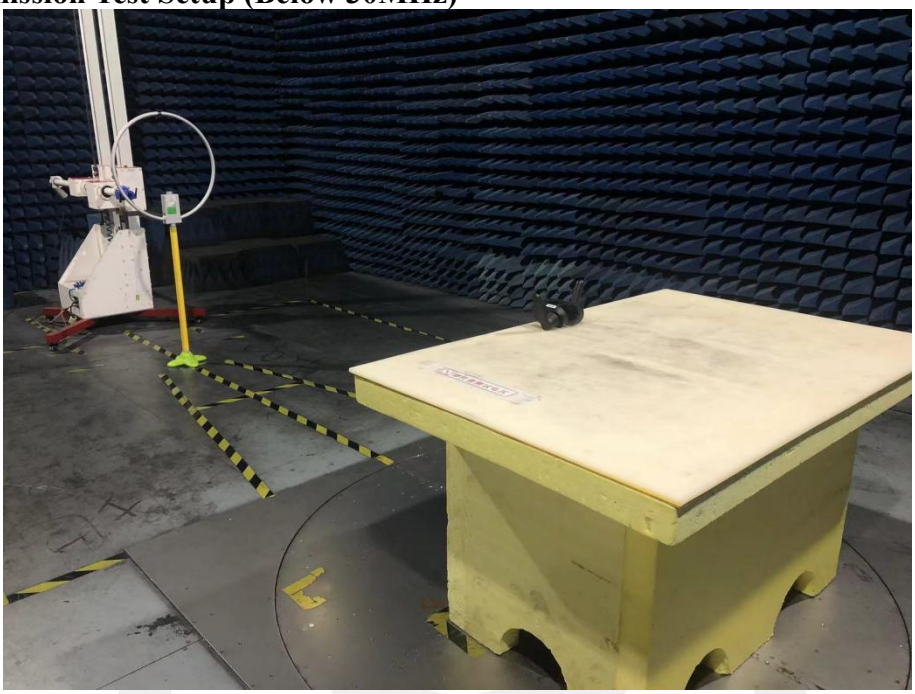
8.5.5 Test Results

Not Applicable

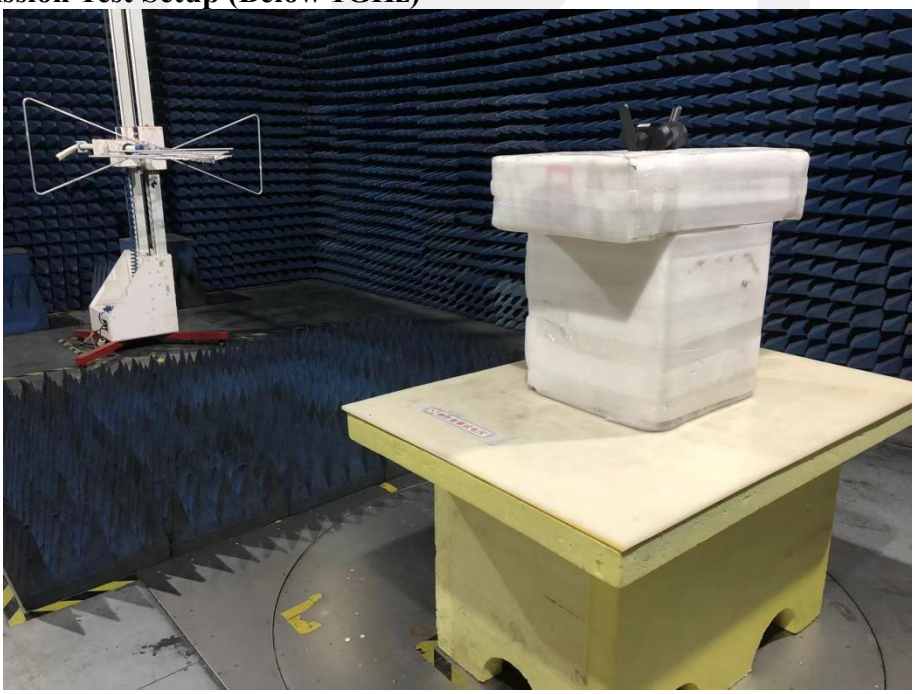
Does only apply to receivers which a not co-located with transmitters

8.6 PHOTOGRAPHS OF TEST SETUP

Spurious Emission Test Setup (Below 30MHz)



Spurious Emission Test Setup (Below 1GHz)



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